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ABSTRACT

Attention is focused in this rather advanced discussion on human goals and human style in the face of present and anticipated future developments in the computer-based technologies as related to English education. The paper admittedly is not objective. The implications of two hypotheses are discussed: that learning systems are not necessarily a threat to the teaching of English and that learning systems may in fact serve as allies of English teaching. Topics considered include: the distinction between means and ends, teaching machines, systems, computer-related learning systems, reevaluation from teachers and the cybernetics industry, individualization versus individuation, education and control, systems teaching and behavioristic control, reappraisal of educational technology business, and general evaluation of computer-involved learning. (LH)

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Cybernation, Systems, and the Teaching of English: The Dilemma of Control

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Foreword

With the exception of a small invitational Conference on Writing Behavioral Objectives for English, there was little on the 1968 program of the National Council of Teachers of English convention in Milwaukee to augur the intense interest in systems approaches that would develop in succeeding years.

At the Washington convention a year later, members of the Council began to come to grips with behavioral objectives, with systems approaches, and with accountability as a concept in education.

It was at the Washington convention that the Commission on English Curriculum began a two-year study of this new force on American education. Much of its task turned out to be learning what the excitement was all about.

At that same convention, Dr. Maxwell Goldberg of The Pennsylvania State University addressed a "confrontation" meeting titled "Learning Systems and the Teaching of English." For many of the participants at the Washington convention, such a notion as learning systems and such related topics as cybernetics, accountability, computer-managed instruction, and similar ideas were not perceived as part of a whole, if they were perceived at all. After the convention, it became apparent that most convention-goers had missed hearing one of the foremost authorities on these topics. When Dr. Goldberg's paper was presented as one to be considered for possible publication in journals, it was

vi. Cybernation, Systems, and the Teaching of English

steered aside and into the set of those manuscripts that might be developed further and made into a book.

From long study of the literature on systems approaches and from extensive contact with a variety of developers and users of cybernetics and systems, Dr. Goldberg has kept abreast of technological developments in the field. But his essential stance has remained that of humanist, not scientist.

In these pages, Dr. Goldberg focuses attention on human goals and human style in the face of present and anticipated future developments in the computer-based technologies that promise to become an increasingly larger part of our lives. His question, "Who controls the system?" is a profound but very real one, demanding knowledge of what is and a capability to predict what might pertain in later years of the age of the computer.

His book requires the reader's close attention. It is not for beginners. It demands a base of knowledge that might be gained from reading other Council publications beforehand. The reader may wish for example to take up first such a book as James Hoetker's *Systems, Systems Approaches, and the Teacher* or *Accountability and the Teaching of English*, edited by Henry Maloney.

But when the reader is ready, he or she will find within these pages a set of perplexing questions, perceptive observations, and a reaffirmation of faith in a nondeterministic, open, vital view of man, who can, given certain cautions, control and use systems to great advantage.

John C. Maxwell, Associate Executive Secretary, NCTE

Preface

Let me start with an admission—not of guilt but of negative intent. This paper does not attempt to treat its subject with complete detachment, objectivity, and balance. It dismisses claims to utter detachment and objectivity as fictions at best and, at worst, self-deceit or hypocrisy. It dismisses the attempt at the balanced presentation as not useful to the purposes of the issues-confrontation for which it is intended. It is, admittedly, a presentation from one specific and limited angle of vision. It seeks to make clear the stance, the perspective related to this angle of vision. It utilizes the satiric hyperbole. This it regards as a legitimate mode of clarifying and highlighting issues and of indicating lines of reservation, doubt, or adverse criticism. It does so, realizing that this practice entails risks—risk of misunderstanding, risk of counterattack. But how, without taking risks, may one participate in confrontations? This, at least, may be said: the present risks are calculated. As for the sensibilities of the reader: forewarned is forearmed.

To set up a debate on learning systems versus the teaching of English is to pose a false issue—a false dilemma. It begs two serious questions: (1) *Are learning systems necessarily a threat to the teaching of English?* and (2) *May not learning systems serve as allies, rather than being regarded as the necessary enemies of English teaching?* My answer to the first question is “No”; and, to the second, “Yes”; and

viii. **Cybernation, Systems, and the Teaching of English**

I intend to devote this paper to confronting the implications of these answers.

This paper owes much to field trips and other researches made possible through a sabbatical leave as Visiting Scholar at the University of Arizona, and through other support made available by the good offices of Dr. Cyril F. Hager, associate dean, College of the Liberal Arts, and director of the Center for Continuing Liberal Education, The Pennsylvania State University. The present study draws heavily, too, on materials and experiences gained through my work as director of the CCLE-IBM Humanities Project on Technological Change, initiated in September, 1963. (See, William W. Brickman and Stanley Lehrer, eds., *Automation, Education, and Human Values*, [New York: School and Society Books, 1966]—especially, pp. 11-26, 29-30. This book has been reissued, by Crowell, as an Apollo paperback—No. A-223, 1969.)

Maxwell H. Goldberg

Distinguish: Means and Ends

At the outset, we must distinguish between means and ends. Thomas Carlyle's use of "machinery" in his *Signs of the Times* and, later in the nineteenth century, Matthew Arnold's distinction between "machinery" and the ends for which the machinery is intended continue to be relevant. Arnold, like Carlyle, of course, used "machinery" both literally and metaphorically. They both applied the term to committees, agencies, organizations, institutions—to bureaucracies as well as to actual machines or instrumentalities. For us, today, Jacques Ellul, in his *The Technological Society*, has put this distinction between means and ends, both more philosophically and more methodologically, and with massive documentation. He has done so in the term used as the title of his book in the original, and, in my opinion, much to be preferred to the title adopted for John Wilkinson's English translation. The original title is *La Technique*; and it carries a comprehensive term for various kinds of instrumentalities and their corresponding processes. To "la technique," Ellul attributes a powerful tendency to become autarchic ("to take the bit into its own teeth"), and to develop, by replication, concatenation, and proliferation, along lines neither intended nor even foreseen by those who invented the machinery or who initiated the processes. As Ellul puts it, "la technique" has its own internal logic of self-development and, somewhat as with Aristotelian entel-

2 Cybernetics, Systems, and the Teaching of English

echy, a powerful impulsion to fulfill itself according to this law of its own becoming.¹

Lewis Mumford has noted such a phenomenon in architecture and in regional planning. Thus, concerning Le Corbusier's "City in the Park," he observes: "The first mistake was the overevaluation of mechanization and standardization as ends in themselves, without respect for the human purposes he served."² Kenneth E. Boulding has noted a similar phenomenon and has warned against it. In his essay on the teaching of social sciences, he has shown concern lest devices adopted as teaching adjuncts take over and become ends rather than means: "The great danger of hardware is that it tends to concentrate on specific and particular performances and behavior and by its very nature cannot be concerned with the total development of the individual,"³ which, as he holistically sees it, should be the end of education.

As to the matter of means and ends in the teaching-learning process, there is another consideration. It may be exposed by reference to the doctrine generally attributed to Machiavelli, that the end justifies the means. This was espoused not only by the admittedly anti-liberal, anti-democratic Thomas Carlyle in his doctrine of the hero as perversely applied to Frederick the Great; but also by such

¹ Cf. Carl Mitcham and Robert Mackey, "Jacques Ellul and the Technological Society," *Philosophy Today* 15, 2/4 (Summer 1971), 102-121; and, by the same authors, *Philosophy and Technology—Readings in Philosophical Problems of Technology* (New York: The Free Press, forthcoming, 1972). In a conversation with me, John Wilkinson has stressed that, for a full understanding of Ellul's treatment of *la technique*, one needs to be familiar with the latter's theology. For our present purposes, it is enough to take cognizance, in a "Note to the Reader" added to the American edition of *The Technological Society*, of Ellul's own statement: "*Technique is the totality of methods rationally arrived at and having absolute efficiency* (for a given stage of development) in every field of human activity." (New York: Vintage Books, 1964), p. [xxv].

² *The Urban Prospect* (New York: Harcourt, Brace & World, 1968), pp. 118, 119, 122, 125.

³ "The Task of the Teacher in the Social Sciences," *Effective College Teaching: The Quest for Relevance*, ed. William H. Morris (Washington, D.C.: American Council on Education, for American Association for Higher Education, 1970), p. 111. Reprinted by permission of the American Association for Higher Education.

champions of liberalism and democracy as William Hazlitt in his own hero worship of Napoleon. The consideration being urged is the converse of this Machiavellian dictum. According to it, one's very commitment to a certain agency influences or may even dictate the outcome—first, by opening up unanticipated potentialities; second, by engendering or eliciting unanticipated hindrances or deflections.

Both of these modes of influencing or dictating outcomes may be illustrated from the realm of computer-utilizing research in the Humanities. One may start out to use the computer just to determine the incidence of certain types of imagery in the poems of Hart Crane. One may find, however, that, thanks to the speed and comprehensiveness with which the computer covers the field and enables complex and multifaceted comparisons and contrasts, one may gain serendipitous insights about the poet's style. Professor George Arms has reported such experiences in connection with his computer-utilizing researches into aspects of the imagery of William Dean Howells.

The opposite, however, may occur. Suppose one sets out to utilize the computer in stylistic studies; and suppose that, for definitive conclusions, one has planned to include certain impalpable, nonquantifiable (at least in the present state of the art) elements of style. Once committed to the computer, one may find that he has altered the parameters of his intended outcomes; and that the present limitations of the computer make him bypass those aspects or phenomena of style which are still not (if they ever will be) "machine handleable." Among these would be, for example, the implicit elements of style. Under these circumstances, there is a strong temptation to simplistic reduction: to forget or ignore the omissions; to conclude that, not just certain parts, but the whole, has been treated. It is here that proper training and the maintenance of proper scholarly scruples may well provide the needed safeguards. We have to keep reminding ourselves of the proverbial warning: "Out of sight, out of mind."

Malcolm Scully provides fresh support for this warning. He quotes James H. Billington, professor of history at Princeton, as writing that "the advent of the computer has

4 Cybernation, Systems, and the Teaching of English

encouraged the trivialization of scholarship and the belief that things that count are those that can be counted"; and that, at the root of the problem, are scholars who "prefer to provide definitive answers to small questions rather than tentative answers to important ones." Scully also cites William H. Simon's statement in the *Princeton Alumni Weekly*: "... there is an imprisoning quality to this new methodology. Once he has accepted it, man can no longer see beyond its own narrow terms. He is compelled to think and act within the confines of the vocabulary and intellectual principles of the methodology." Even John G. Kemeny, president of Dartmouth College, who, as computer champion, may be described as the protagonist of Mr. Scully's story, ruefully admits that "there is a very strong tendency on the part of some research workers to rely so much on the use of computers that they don't use their own brains."⁴

As with research in the Humanities—so with teaching English. Those who work in computer-involved instruction should be aware of possible deviations from the intended or expected outcomes. At the extremes, we need to guard against allowing our course content to atrophy and our comprehensive objectives to fade from sight because of excessive preoccupation with mechanics; and against allowing our teaching energies, as John Henry Newman has put it, to be "exhausted on externals." "It is argued," declares Dr. Boulding, "that hardware will relieve the teacher from burdensome and unnecessary duties and leave him free to concentrate on the great personal task of developing the total personality of the student." "This sounds fine," he goes on to say; then adds: "but one has one's suspicions, and a nightmarish future in which the teacher becomes primarily an electronic repairman and the students all turn into well trained rogues and clods is not inconceivable."⁵

In assessing the weight of this statement, one has to bear in mind that, far from being a technophobe, Dr. Boulding

⁴ "Computers, Big in Research, Little Used by Undergraduates," *The Chronicle of Higher Education* 6, 3 (October 1971), 5.

⁵ "The Task of the Teacher in the Social Sciences," p. 111.

shows enthusiasm for the potentialities of cybernated research. Thus, he is cited as envisioning the development of a computer "on which the totality of human history has been encoded and from which samples can be taken, relations perceived, discrepancies identified, and continuously new questions asked and gaps in data discovered."⁶ If accurately quoted, Dr. Boulding here lays himself open to two challenges. The first is immediate: if the record contains the "totality of human history," how can it have gaps? The second is ultimate, and it was anticipated, in his essays on the writing of history, by Thomas Carlyle: is it possible for any *human* historian, however gifted and however encyclopedic, to include the totality of history? Do not the finiteness of the human mind and the limitations of the documents and man's memory place severe limits on realizable aspirations toward totality of recovery?

For several years, I have conducted programs in continuing humanistic studies for corporate executives. I have noted that a number of these men, connected with companies promoting computers in education, have professed almost no interest in the computer—except as means. They have tersely referred to it as a fast and versatile "book-keeping machine." In people whose job it is to sell these machines, being content with such unimaginative emphasis upon means—as though the means were the end—may be justified. It is regrettable, on the other hand, in those who profess to be interested in computers as aids toward more effective teaching. Here, one needs to exercise wariness even though, in doing so, he runs the risk of being called what, at the Yale Conference on the Computer and the Humanities, Jacques Barzun was called: "an intellectual Luddite," because he dared to raise questions concerning certain advocated uses of the computer in education.⁷ As it later turned out, Dr. Barzun's doubts proved justified.

⁶ Scully, "Computers, Big in Research," p. 5.

⁷ Cf. *Computers for the Humanities: A Record of the Conference Sponsored by Yale University on a Grant from IBM: January 22-23, 1965* (New Haven, Conn.: Yale University, 1965), pp. 146-150.

Teaching Machines

In his 1962 article on "Teaching Machines," H. T. Fitzgerald helped mark the limits of usefulness of machine-related learning systems, and to signal the abuses to which they are liable. In the pre-computer teaching machine, Mr. Fitzgerald saw the dehumanizing effects of spending so much time with machines instead of with fellow human beings (for all their imperfections!). Also, he saw the very dilemma of control signalled in the title of the present paper: the "intrinsically undemocratic—worse—anti-intellectual theory of learning—the theory of reinforcement, of rote learning, of stimulus-response." Mr. Fitzgerald likewise declared:

... the task of intelligence is more than that of a warehouse employee picking stock down the aisles, more than that of a novice reciting a long catechism of correct answers. Education is also inquiry, insight, emergence, the development of a critical faculty and an intuition of the web of interdependent hypotheses and inferences, the structure of abstractions about the seen and unseen that comprises our understanding of the physical world. Learning is also exploring, conceptualizing, experimenting, interacting, valuing. Reality is also process, flow, a great running together, a barely intelligible, absurd, endless poem, a brilliant light at the entrance to our cave.^a

It may be protested that Mr. Fitzgerald wrote this in the early 1960s, and that it is therefore outmoded. On the contrary, Mr. Fitzgerald has gone right to the enduring cen-

^a H. T. Fitzgerald, "Teaching Machines," *Midway* 13 (Winter 1963), 48-50. Reprinted from *School Review* (Autumn 1962). Compare the following:

To a Teaching Machine

You sparking fugitive from science fiction,
Mindless pattern-parrot! You may fool
The educationalist, whose predilection
For mass indoctrination brought the rule
Of bell-shaped curves and life-adjustment courses.
Go shake medusa tapes at dolts who trace
Poetic litter, measure Trojan horses
In feet instead of terror! Go replace

tral issues posed by various types of mechanical learning systems—whether pre-electronic or electronic. As applied to the far more sophisticated learning systems that employ cybernational instrumentalities, these issues are just as relevant today as they were when first presented.

Much more recently, Kenneth Boulding has made similar observations, and these pertain, specifically, to cybernetic learning systems. Indeed, he characteristically uses cybernetic terminology and imagery (both literal and figurative)—as, for example, “feedback.” He observes: “The whole secret of programmed learning, in so far as there is one, is presently to build evaluative feedback closely into the learning process, so that every time a student does anything it may be evaluated and the evaluation fed back to him.” He adds: “Programmed learning, however, is not the answer to all our problems,” and this for several reasons. First, there are many learning processes, “those which involve the structuring of complete images of the world, in which we have to learn to operate without positive feedback or reinforcement for long periods.” By way of illustration, he cites the “mysterious processes by which the slow building up of a vocabulary and grammar eventually leads to fluency in a language or by which little bits of learning add up to mastery of a musical instrument.” These, he declares, “are very little understood,” and hence, he implies, are not susceptible to the evaluative feedback of programmed learning. The second reason why Dr. Boulding believes that programmed learning is not the answer to all our problems is that, out of “boredom or out of a sense of being insulted or out of a loss of personal dignity, programmed learning—if

The pedant heads that catalog dead Greeks
With magnet heads whose charge of static fact
Informs by rote. Man-fed, the oracle speaks
Its data patterns; computers interact
To usurp only the drudge's toil, and free
The human teachers for humanity.

Hugh Pendexter III
Armstrong College of Savannah

(*The CEA Critic* 30, 8 (May 1971), 15. Reprinted with the permission of the author and the College English Association. Copyright © 1971 by the College English Association, Inc.)

it is too picayune—may discourage people from learning.” Third, programmed learning fails to perform “a good deal of the functions of a teacher,” which is “to cheer students up, to encourage the discouraged, and to keep alive the students’ sense of dignity and worth in a process that often destroys self-confidence and the sense of personal worth.” Elsewhere he remarks that the teacher is a “nonlinear computer of enormous capacity produced initially by entirely unskilled labor, and the economics of biology in the long run may outrun the economics of mechanical and electrical engineering.”⁹

Systems

A strong case can be made for the reticulum as ascendent or dominant epochal image in our technetronic age; and for the systems network as a major specific embodiment of that master image. My forthcoming study, in three parts, deals with “The Reticulum as Epochal Image for the Technetronic Age,” “The Reticulum as Characteristic Paradigm for the Technetronic Age,” and “Buzzati’s *Larger than Life* as Reticulum Symbol System of the Technetronic Sensibility.” The first of these is forthcoming in the *Yearbook of Comparative Criticism*, edited by Joseph P. Strelka. One illustration accompanying Malcolm G. Scully’s “Computers, Big in Research, Little-Used by Undergraduates” illustrates the increasing prevalence of the reticulum imagery in connection with the latest technetronic achievements and cybernetic potentials. This is a drawing, by Dill Cole, measuring 6" × 8" on an 11½" × 15" page. It shows a great computer at the center, with ribbonlike interconnections winding around the computer and connecting various academic buildings. These interconnections closely resemble the computer’s magnetic tape; and they thus suggest the cybernetic reticulum or network.

There is now a whole family of mind that embraces a comprehensive system *Weltanschauung* and view of man and

⁹ “The Task of the Teacher in the Social Sciences,” pp. 107, 111.

society;¹⁰ hence of education as a personal and societal systems process. Kenneth E. Boulding is a good example. In his exposition of the task of the teacher in the social sciences, he emphasizes that one important part is teaching about "social systems." This includes the "folk knowledge" of social systems, a good deal of which lies "below the level of reflective thinking," yet much of which is expressed in that "rich but by no means systematic and consistent" body of "popular wisdom" in the form of aphorisms and proverbs. In Dr. Boulding's view, it is the principal task of formal education in schools and colleges to expand the student's image of the world beyond his personal experience and to give him an image which encompasses the total system of the earth or even of the universe--that is, of what he, Adlai Stevenson, Barbara Ward, and Buckminster Fuller (who claims credit for launching the term) have called "Spaceship Earth."

Indeed, Dr. Boulding declares that the "awkward mixture of folk and formal knowledge that constitutes even the sophisticated images of the social systems may still give the teacher of the social sciences a certain advantage." For, as he sees it, "the process of teaching and learning is itself a part of the social system"; and for him, the classroom "is a social system." Hence, he hopes, the teacher will "perceive the teaching and learning process itself as essential to all social systems, as the process by which is transmitted and expanded that stock of knowledge in which all other activities of society are based."¹¹

From the point of view of the systems mind-set, then, the teaching-learning processes are generally functions of systems networks; hence, the recently emerged and so-called

¹⁰ Fremont E. Kast and James E. Rosenzweig, *Organization and Management: A Systems Approach* (New York: McGraw Hill Book Co., 1970). Compare José Ortega y Gasset, *History as a System, and Other Essays toward a Philosophy of History* (New York: W.W. Norton & Co., Inc., Paperback N 122, 1961); Ervin Laszlo, *The Systems View of the World* (New York: George Braziller, Inc., 1972); Robert Boguslaw, *The New Utopians: A Study of System Design and Social Change* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1965).

¹¹ "The Task of the Teacher in the Social Sciences," pp. 104-105.

10 Cybernation, Systems, and the Teaching of English

"learning systems," to such a mind-set, are but particular cases of what has generally been going on for centuries.

It is therefore worth our while to consider the key term *systems* more closely—a term nowadays so miscellaneously and often so uncritically, superficially, and loosely used. This use varies from the colloquial "Is this a system?" through the banality, "You can't beat 'The System'" (when it is almost equivalent to "The Establishment"), and through its use in technological, industrial, and bureaucratic idiom to designate any organization or process that is fairly complex, and both functionally and structurally articulated and unified (i.e., "rationalized"). Then it has its much more complex suggestions of conceptualizations and implementations signalled by the terms "Systems Theory," "Systems Science," "Systems Technology," or "Systems Analysis." This last is seen in the field designated "General Systems," which has a history of little more than thirty years, and with which such names as Norbert Wiener, Buckminster Fuller, Karl Deutsch, Ludwig von Bertalanffy, Simon Ramo, and Kenneth Boulding are associated; and such agencies as the Rand Corporation, the Hudson Institute, and others among the so-called "Think Tanks."

Two of the semantic problems connected with systems thinking that should cause English teachers serious concern are: (1) the tendency of systems imaging to flip from figurative analogy to literalness, with resulting logical confusion and, often, practical mischief; (2) confusion between closed-systems imaging and open-systems phenomena, the deterministic premises that are appropriate to closed systems. In developing a national research consultation on frontiers of research in problems associated with blindness, I found, both among the arts and sciences scholars involved and among those working on problems associated with blindness, dominance of systems thinking and systems imaging; for a discussion of this, see my chapter "Models, Values, and Research" in the consultation proceedings (*Blindness Research, the Expanding Frontiers: A Liberal Studies Perspective*, edited by M. H. Goldberg, The Pennsylvania State University Press, University Park and London, 1969).

An example of the harm generated by the first of these

types of aberration in systems thinking is to be seen in the analogetic likening of a society to an organismic system. In such a system, it is pointed out, a healthy metabolism is necessary to a healthy organism; unassimilable elements upset the metabolism and hence the equilibrium of the system. Yet continual restoration of equilibrium is vital to the health of the system. Hence you have to get rid of elements thwarting this. You have to get rid of the unassimilable ethnic groups, as in Nazi Germany, or the unassimilable social (class) groups, as in Soviet Russia of the 1930s. Thus, literal application of an originally figurative analogetic conceptualization leads to genocide.¹²

In previous pieces, I have made a recurring effort at semantic and symbolistic prophylaxis in order to expose the frequent indulgence in the pathetic fallacy—whether for purposes of dramatization and publicity or for whimsicality and comic relief—by computer people.¹³ Often they seem to forget that they are playing make-believe; and they let their metaphors and figurative analogies—with confusing, sometimes with mischievous consequences—go literal. Journalistic pieces provide excellent opportunity for developing skill in this much needed prophylaxis. Examples are “Love that Computer” (*Life*, 6 November 1970, pp. 80–83) and Brad Darrach’s “Meet Shaky: The First Electronic Person!” (*Life*, 20 November 1970, pp. 58ff.), with the subtitle “The fascinating and fearsome reality of a machine with a mind of its own.” It becomes more and more apparent that such exercises take us beyond customary semantics and symbolistics. They take us into epistemic and ontological frontiers. They confront us with such fundamental questions as what we mean by “mind,” “intelligence,” “awareness,” “conscious-

¹² Cf. “The Systems Approach: Myth or Reality,” topic at Conference on Reappraisal of the Educational Technology Industry, Nov. 16, 1969, University of Chicago, sponsored by Urban Research Corporation.

¹³ See my “Technological Mythmaking and Humanities Teaching,” *School and Society* 96, 2303 (February 1968), 98–99; “Heart Transplants for the Humanities?,” *Liberal Education* 44, 3 (October 1968), 456–466; “Socrates, the Computer and Ivied Walls,” *School and Society* 97, 2320 (November 1969), 424–427; “Future Shock and the Technetronic Age,” *Humanities in the South* 33 (Spring 1971), 1, 3, 4, 6; and “The Humanities—Past, Present, and Future: A Partisan View,” *Bulletin, Southern Humanities Conference* (Fall 1971), 6.

12 Cybernation, Systems, and the Teaching of English

ness," "sensibility," and "conscience." For example, by an odd twist, the supposedly dead doctrine that, where we have analogies, we have identities or equivalents is being revived; and the conventional lines between the figurative and the literal are being blurred or broken. Raising these questions has not been limited to the mass media and the popular press.¹⁴

The second type of aberration occurs when one misapplies the deterministic premises of closed-system thinking to organisms. In his *Toward a Homeodynamic Society*, which seems to owe much to Sir Jeffrey Vickers' *The Undirected Society*, Robert J. Blakely, formerly vice president of the Fund for Adult Education, contributes to the elucidation of this matter. In this monograph, usefully for our purposes, he distinguishes among three related terms. The first of these, now widely current in systems thinking, is *homeostasis*, coined by Walter B. Cannon, deriving from Greek words meaning *similar* and *stand* and signifying "a relatively stable state of equilibrium, or a tendency toward such a state between the different but interdependent elements or groups of elements of an organism or group." (Webster's *Seventh New Collegiate Dictionary*, p. 398.) Extending the idea, the biologist C. H. Waddington "coined the word *homeorhesis* (*similar* plus *flow*) to designate the regulatory process by which an organism returns to a normal path of development after it has been put off course by external influences." What is called for now is "a new type of person and a new type of society" characterized by a new-coinage, *homeokainis* (*similar* plus *invent*) to designate "a kind of course setting and course holding into the unknown."

¹⁴ See, for example, Marie Borroff, "Creativity, Poetic Language, and the Computer," *The Yale Review* 60, 4 (June 1971), 481-513; Edward Pol, "Consciousness Makers and the Autonomy of Consciousness," *ibid.*, [514]-531; Robert Lechner, "Toward a Philosophy of Technology," Hans Jonas, "The Scientific and Technological Revolution," Donald Brinkmann, "Technology as a Philosophic Problem," and Simon Moser, "Toward a Metaphysics of Technology"—all in *Philosophy Today* 15, 2/4 (Summer 1971); Michael J. Apter, *The Computer Simulation of Behavior* (New York: Harper and Row, Colophon Books, 1971).

In this third term, as well as in the term *homeodynamic*, Mr. Blakely suggests that capacity for deliberate initiation and self-assertion, which according to Ludwig von Bertalanffy, René Dubos, and others, warrants a nondeterministic reading of man as a psychosomatic (neuro-physical) and bio-social system.¹⁵ Professor von Bertalanffy, himself one of the originators of the "General Systems" theory, and by some called its "father," points out that nondeterminism rather than determinism is the dominating trait of the open system, that organisms are such open systems, and that man, especially, shows the capacity for variant, internally originated and outwardly asserted reactions to stimuli.¹⁶

It is of interest to note that Professor von Bertalanffy, himself an organismic holist, dedicates his *General Systems* to Goethe, while other systems scientists, philosophers, and technologists trace their ancestry back to Descartes and his treatise on method, or to Auguste Comte. As a matter of fact, such genealogical effort could well carry us back to the Romans and their inspired hold on systemics—from vast networks of roads and viaducts to the grand architectonics in their codifications of the law and in their legal systems themselves.

In order to maintain learning systems in their appropriate role in education, one must keep viewing such systems in relation to the movement toward comprehensive systems

¹⁵ Robert J. Blakely, *Toward a Homeodynamic Society* (Center for the Study of Liberal Education for Adults [formerly at Boston University]: 1965), pp. 51–52 [available from University College, Syracuse University]; Walter B. Cannon, *The Wisdom of the Body* (New York: Norton Company, 1963); C. H. Waddington, *The Ethical Animal* (New York: Atheneum, 1961); Geoffrey Vickers, *The Undirected Society* (Toronto: University of Toronto Press, 1954); René Dubos, "Toward a Humanistic Biology," *American Scholar* 34, 2 (1965), 188–189, 191–192; idem, *So Human an Animal* (New York: Charles Scribner's Sons, 1968); Caryl D. Haskins, "A Message for Our Times" [review of *So Human an Animal*], *Virginia Quarterly Review* 45, 1 (1965), 128–135; Stanley Burnshaw, *The Seamless Web: Language, Thinking, Creative Knowledge, Art-Experience* (New York: Braziller, 1970).

¹⁶ Cf. Ludwig von Bertalanffy, *General Systems: Foundation, Development, Applications* (New York: Braziller, also paperback, 1969); idem, *Problems of Life* (New York: Harper Torchbooks, 1960); *Organismic Psychology and Systems Therapy* (Worcester, Mass.: Clark University Press, Heinz Werner Lecture Series, 1968).

14 Cybarnation, Systems, and the Teaching of English

organization and functioning. Thus, in his Commencement Address of 1964, President John A. Stratton of the Massachusetts Institute of Technology referred to the importance of our seeing "the great new socio-technical problems and the systems they represent." Again, in his "Science in the University," Paul Weiss advocated a pattern of "efficient super-universities," an "Integrated University Compact," achieved through "the linkage of existing autonomous institutions of higher learning into self-regulatory networks." More specifically, Dr. G. Bruce Dearing, now vice-chancellor of the State University of New York system, has urged "the application of the implications of the systems approach" to many aspects of education and the application of "rigorous comprehensiveness" and of "manipulating models of systems and subsystems" to help solve problems, however complex, of an educational institution.

According to Dr. Dearing, this systems approach to the problems of education in a technological epoch calls for a certain degree of sophistication. It calls for recognition that it "is perfectly possible within a system to achieve a steady state, where inputs and outputs are so balanced that an equilibrium, not a stasis, is established";¹⁷ and this equilibrium can be a vital, a dynamic, a creative equilibrium. It is significant that this strong advocacy of what Buckminster Fuller would call a "comprehensivist" systems approach to education comes from a nondeterministic humanist, a former professor of English, and one devoted to the humanizing imperatives of freedom and dignity. Thus, while there is a strong coercive and totalitarian potential within "systems thinking," those who embrace it are not doomed to it or bound to it. Among them are strong and influential exemplars of the opposite potential,¹⁸ and they should serve as heartening, emulative models for us who may be drawn to

¹⁷ Julius A. Stratton, *Daedalus*, issue on "The Contemporary University: USA," 93 (Fall 1964), 1238-1243; Paul A. Weiss, *ibid.*, 1184-1217; G. Bruce Dearing, "Schools, Styles, and Systems in Thinking," inaugural address as president, State University of New York, College at Binghamton, Sept. 25, 1965.

¹⁸ Cf. G. Bruce Dearing, "Education for Humane Living in an Age of Automation," *Automation, Education, and Human Values*, pp. 99-106.

the systems approach in the teaching of English, as to systems organization of schools or colleges.

Computer-Related Learning Systems

Experts in the field of programmed learning are divided among themselves on the question of the claimed superiority of electronic learning systems to the book-utilizing programmed learning systems. President Kemeny of Dartmouth College is a most enthusiastic advocate of computers in education. He has declared that "the difference between students who have their hands on a computer and those who don't is the difference between the dark ages and modern life." He has further declared that "accreditation teams should refuse to accredit institutions that do not provide decent computer services for undergraduate education." Yet he has likewise declared: "The computer is a very poor substitute for a book."¹⁰ Dr. Donald J. Lloyd, internationally recognized expert in programmed learning through books, insists that this method provides by far the best assurance for learning that is at once systematically efficient and genuinely individualized.

One other medium has not yet found its ultimate use—the spectacular laser. In spite of the millions of dollars devoted to research and development, and the rapid growth of the laser industry itself, the laser remains somewhat as in Pirandello's play, a character in search of a plot—"an invention in search of a need." ("Light of the Future," *Yale Alumni Magazine* [January 1969], 22-25.) To date, one of the laser developments that seems to have promise for electronic teaching-learning is halography. "By photographing a subject illuminated by coherent light, and by illuminating the resulting photographic transparency with coherent light of the same frequency, a true three-dimensional image of the photographic subject appears." (p. 23.) This could be a possible future source for three-dimensional educational

¹⁰ Cited by Malcolm Scully, "Computers, Big in Research," pp. 1, 4-5.

16 Cybernation, Systems, and the Teaching of English

TV. Also, it could be used to create simulated three-dimensional teaching environments—as both George Leonard and Alvin Toffler have envisaged.²⁰

Whatever the stand one takes about this claimed superiority of electronic learning systems, he must recognize that, in recent years, the computer-related learning system has taken the center of the stage in professional discussions of teaching and learning; and that cybernated teaching-learning instrumentalities and processes will continue to enjoy the spotlight. Hence a treatment of the computer and English teaching is a good way to explore the comprehensive central issues having to do with learning systems and English teaching.

We find the computer making its impacts and having implications outside our courses. The Engineering Concepts Curriculum Project has made the computer the central character in its series of sizeable volumes and syllabi on *The Manmade World* (available from the Brooklyn Polytechnic Institute). This is subtitled “a course in the theories and techniques that contribute to our technological civilization.” It is designed for students who are *not* going into technological pursuits themselves. The computer was selected for this key role on the grounds that, to date, it is indeed the most dramatic and most potent instrumentality—both in itself and as teamed up with other agencies—both man and machine agencies—which technology has produced, and through which technology is making its most powerful impacts on the individual and society. Designed for high school programs, the ECCP materials are used, also, in college courses.

The special fifteen-page feature which *American Education* (November 1967) ran, on the computer and education, carried the caption: *There Is a Computer in Your Future*, and this aptly suggests the pervasiveness of the impact and implications of the computer for us teachers. Indeed, we may well distinguish six main areas of such impact and implication: (1) the administrative environment; (2) our

²⁰ George B. Leonard, *Education and Ecstasy* (New York: Delacorte Press, 1968); Alvin Toffler, *Future Shock* (New York: Random House, Inc., 1970).

own professional training—or re-training; (3) how we teach our courses; (4) what we teach; (5) our study and research; (6) our personal lives. This last includes our attitudes, the very imagery and other furnishings of our mind (our “in-scape” or “inner landscape”), and our cultural participation.

These categories were used in setting up the topics for an exploratory evaluation consultation, May 23, 1971, under the auspices of the Penn State Center for Continuing Liberal Education, on “The Computer, Values and the Humanities.” An interesting point made at this consultation, and noted in a *Behavior Today* report on the sessions, was that several of the participants admitted that “fooling around” with computers can be addictive: “You can get hooked on it.”

So far as (1) environment is concerned, whatever the computer does to improve scholastic data processing, scheduling, and the like is to our gain. True, the IBM card has often been treated as symptom and convenient scapegoat for anxieties, fears, and frustrations related to people’s sense of threat that the computer holds for their personal and human dignity. These are threats of depersonalization, of being mechanically manipulated and controlled. This is how, as Kenneth Keniston has pointed out, the protesting students at Berkeley regarded the IBM cards that they publicly tore up. Kept from excess, a wariness about possible alienation through computerization should not be amiss for English teachers.

So far as (2) our professional training and (3) our teaching methods are concerned, they make up a big topic and merit full treatment on their own. In this paper, they will be treated largely by implication. Here it may be indicated that programming a computer and effectively exploiting it in teaching should become part of a course for beginning teachers or for those already teaching yet in need of being brought up to date. As Dr. Edmund J. Farrell has put it, such a course would “go well beyond the oft-criticized audio-visual requirement for certification.”²¹ My prediction is that programming and handling the computer, as well as critical

²¹ *English, Education, and the Electronic Revolution* (Urbana, Ill.: National Council of Teachers of English, 1967), p. iv.

18 Cybernation, Systems, and the Teaching of English

evaluation of it, will be treated, not just as a unit within a more comprehensive course, but as at least one full course in itself (one semester at first; ultimately a year). Treatment of (4), what we teach, would consider two topics: (a) the opportunities opened up and the limitations imposed by the adoption of the computer as teaching medium; and (b) the treatment of computer-related subject-matter in our courses.

For example, (4b) might mean introducing essays, articles, stories, plays, and poems about the human implications of the computer—including the computer as subject for imaginative writings. Examples would be: Arthur C. Clarke's *2001: A Space Odyssey*, together with the screenplay and the MGM film, by Stanley Kubrick and Arthur C. Clarke, on which the novel is based (it is significant that the screenplay comes first, not the novel, as has been the usual order); Michael Crichton's *The Andromeda Strain* (together with the screenplay and film based upon it); Dino Buzzati's *Larger than Life*, a cross between a philosophical Gothic novel like *Frankenstein* and the scientific romances of H. G. Wells; Sam Shepard's play *Operation Sidewinder*, as well as other humorous and satiric treatments such as Mark Epernay's (John Kenneth Galbraith's) *The McLandress Dimension*, especially the chapter on the fully cybernated State Department, Michael Freyn's *The Tin Men*, and Michael Crichton's *The Terminal Man*. In other pieces, I have set forth concerns to which, with regard to the computer and computer-related learning systems, our English teaching should be directed.²² Among these concerns are therapeutic functions—such as providing counterpoises to the strong tendency of cybernational imaging to take possession of the mind and hence of our thinking, imaging, feeling, and perceiving; sanative correctives to the tendency of cybernation to produce “future shock” in the inadequately prepared individual (future shock being that sort of disorientation which hits one if the future arrives too fast—before there has been adequate psychic preparation for it); and vicarious advance experiencing of new or modified modes of sensibility, this

²² (Publishing information for the works of Arthur C. Clarke, and the others, and the titles of my other pieces are provided on page 55.)

experience serving as creative reaction to the envisaged further developments of exponentially accelerating technetronic change.

As for (5) study and research, even if we do not have high personal scholarly ambitions, nevertheless, for purposes of enriching the context of our own teaching, of adding to its vividness and vitality, we should take advantage of the substantial aid the computer may give as to the storage and retrieval of scholarly information, and as to the conduct of some types of scholarly research. Among these are compilation of indexes, collations of texts, building up of concordances, and other types of research that involve countings, descriptions, classifications, comparisons, and contrasts. For most of us devoting our professional lives largely to teaching, the computer will make its contributions indirectly—by facilitating for us access to the researches by others that yield the scholarly findings upon which, in turn, we draw.

One illustration should be mentioned of the contribution of the computer in the way of providing the teacher, who is not himself a research-editor, with materials to be used in his course. One such enterprise is directed by Mortimer Adler, whereby the teacher of American studies or social studies may go over the lengthy lists of related documents stored by the publishers in computer memory banks, and select those documents he wishes for his course. He then orders these documents and gets them, as "print-outs" making up a book, from the computer-stored master collection. This gives a new sort of flexibility to the teacher, and places at his personal command scholarly resources that he might not amass by a lifetime of traditional research and editing on his own. It also gives him a sense of pedagogic creativity.

As for (6) our personal lives, this, too, would be treated as at least a unit in teacher training courses—if not as a full course in itself. At The Pennsylvania State University, with the strong initiative and administrative support of Dr. Arthur O. Lewis (associate dean for Resident Instruction, College of the Liberal Arts, and professor of English) and through the efforts of the Council on the Humanities of this college, several upperclass-graduate programs have been launched that offer the prospective or in-service teacher

of English the opportunity to study this whole field. One is a seminar in the teaching of the Humanities. Others are: an interdisciplinary course on technological change, human values, and personal dignity; a three-term interdisciplinary liberal arts honors program on the same theme; a course on the computer, values, and the person; and two courses on the computer and research in the Humanities. Some of these new courses are being included in a new upperclass and minor program, Science, Technology, and Society.

What, then, happens when, in our English courses, we get computer-involved learning? For a deftly written and detailed response to this question, I strongly recommend the previously cited *English, Education, and the Electronic Revolution* by Edmund J. Farrell.²³ On the basis that Dr. Farrell provides, I shall do some updating and other supplementing, some interpretation, and a good deal of critical review and admonitory prospection. To be somewhat neurotic, and even, occasionally, a bit paranoid is conducive to psychic strength in life's confrontations and copings. Yet far from seeking sadistically to prey on the prejudices, anxieties, and fears of my professional colleagues, my intent is to help toward such an appraisal of futures as will both alert us to real threats and dangers and make freshly vivid real potentialities for gain.

Generally, "the extent to which computers are used on campus has increased phenomenally in the past decade." Yet "most undergraduates still lack contact with computers." It has now become quite clear that several years ago, some of our educators, eager to be identified as at the forefront of professional progress, and others, eager to promote the quick and large-scale sale or leasing of computers for teaching, were not adequately critical. The uncritical boosting and promotion took the form of several types of premature or otherwise unwarranted claims. Because of this, "much of

²³ Cf., too, Dr. Farrell's *Deciding the Future: A Forecast of Responsibilities of Secondary Teachers of English, 1970-2000 A.D.*, Research Report No. 12 (Urbana, Ill.: National Council of Teachers of English, 1971). The study should become a must in "futuristic courses." Dr. Farrell is the assistant executive secretary, National Council of Teachers of English.

the early enthusiasm about computers for instruction cooled," and we have been going through a period of second thoughts—both with regard to the computer as adjunct to the teacher and with regard to "mainline approaches." The last-named amount to "a new system" which "envision[s] a modular organization for instructional units and a self-paced individual environment." In mainline approaches, the "materials are engineered for effectiveness, efficiency, and appeal to students."²⁴

One of the unwarranted claims of several years ago was that of "instant salvation" by computer-aided instruction. Mere possibilities of the middle or further-range future were treated as imminent and instant solutions. In part this was due to that extravagant optimism which marks one strong component of our current technological millennialism. In part this was due to excessive promotional zeal. The latter had two main motivations: (1) to gain personal or institutional prestige from being linked with what seemed the frontiers of educational progress; (2) to encourage, in teachers, receptive attitudes toward what, to them, would appear as threatening to their comfort and security and to their professional integrity. The threats were often felt to be of two sorts: (1) to the individual in his professional capacity; (2) to the individual in his personal and social capacities. The second type of threat registered as a concern for diminishment of the person and for a further and radical materializing of the social milieu and culture. Regarded as reactionary and paranoid several years ago, this second type of feeling of threat is now considered quite realistic even by some who, until recently, were unqualified advocates of cybernation.

The same motivations would hold for another sort of premature and extravagant claim. This was that, before long, the computer would do the whole job of education—far more than memorization or information retrieval through routine training in mental or mental-motor skills. It would include motivational-emotive and attitudinal education, edu-

²⁴These citations are from Malcolm Scully, "Computers, Big in Research," pp. 1 and 4.

22 Cybernation, Systems, and the Teaching of English

cation of imagination, education in advanced, sophisticated, value-laden, or at least value-related, intellection—as in graduate courses in symbolic logic. The mood reflected in this claim has been like that of Francis Bacon's "I have taken all knowledge to be my province." In this case, the totalism has assumed the form: *The computer takes all teaching as its domain.*

Education in advanced intellection was early associated with the computer. First, the computer was personified as *she* (teacher) or as *he* (tutor). Then the *he* became a special sort of tutor—a Socratic tutor, infinitely wise. In my files is a collection of instances of the use of this epithet not only in the popular press but also in professional journals. One of the most dramatic examples of this, perhaps, was that issue of *American Education* which devoted a fifteen-page section to computer-involved instruction (November 1967).

Running through this feature was a sentimental and often coy or flippant personalization of the Computer-Tutor—"He" was pictured as never flaring up, always patient, never needing coffee-breaks; never repelling by B.O. or B.B.; with a fantastic memory for the student's own responses; and eventually, in contrast to the old-fashioned "human-type" teacher, all-knowing. Along with this laudatory picture of the computer went a patronizing degradation of the "human-type" teacher. This hit bottom when, in one of the articles, the author gave the assurance: if the human-type teacher did not fight computerization, if he behaved himself, he would not lose his job. Some few tasks would remain for him, until time, by retirement or death, solved his problem of virtual technological unemployment and of consequent pedagogic "featherbedding."

The tendency toward superlative claims for computer-involved systems education reached a peak when a distinguished scholar, scientist, and university administrator, Dr. Ralph W. Gerard, dean of the Graduate School, University of California at Irvine, declared: "computerizing the whole of education, bringing all resources—all libraries and everything else—into a machine-handleable form"—this will build "the necessary program for very rich Socratic tutorial inter-

action with students,"—and "even at fairly high levels."²⁵

In this last is more than a hint as to why, from the teaching profession itself, the extravagant claims of the computer-systems enthusiasts and promoters produced a backlash. The latter kept protesting, officially, that they were not out to replace the human-type teacher. Rather, with his own best interests at heart, as well as those of his pupils, they were seeking to release him from bondage to routine and drudgery and for the nonroutine, creative phases of teaching. But many—with short-sighted, economy-minded administrators and school committees or boards of trustees in mind—thought, with Hamlet: *Methinks the lady doth protest too much.*

In unguarded moments, the extremists let fall remarks which suggested that, while they talked only "Computer-Aided Instruction," their impulse was toward total takeover by computer instruction. They revealed this through the already cited condescending assurance that, after all, if he behaved, there would still be some few tasks remaining to keep the old-fashioned human-type teacher going. One strong advocate of pervasive teaching-learning by computer remarked: "It will be good to keep a few of the old, human teachers around. They will serve—as do fossils in a museum or early models in the Smithsonian—to show the superiority of cybernated learning."

The same build-up of exponentially accelerating momentum toward totalistic takeover has been noted in the cybernation-systems movement as asserted in libraries. Dr.

²⁵ Ralph Waldo Gerard, "The Future Shape of Education," *Symposium II: Technology and Education in the 21st Century* (San Francisco: Center for Technological Education, San Francisco State College, 1967), p. 54. Cf., too, Dr. Gerard's statements: "... We set up ... a computer 'facility' rather than a computer 'center,' to imply interpenetration rather than a boundary," (p. 52); and "I like to think of the total system as a sort of sandwich, of data bank on one side and users on the other ..." (p. 53); also idem, ed., *Computers and Education* (New York: McGraw Hill, 1967). Although entitled "Computers and Universities," "the discussion in fact also touches extensively on other sectors of education, hence, the broadened title of this report" (p. iii). See, too, my "The Structure and Problems of Human Values," *Symposium II: Technology and Education in the 21st Century*, p. 87, where a critique of Dean Gerard's totalistic model of computer education is given.

Ellsworth J. Mason's mordantly satiric and cogently documented negative report on this movement, "The Great Gas Bubble Prick't; or, Computer Revealed by a Gentleman of Quality," carries this epigraphic dialogue: "If it costs you twenty-five percent more, will you stop it?" "No." "Why not?" "Because we believe that sooner or later all libraries will automate." In the article itself is the following: "More harrowing than the enormous cost is the fact that a *computerized system is virtually irreversible*. . . . Once you begin a systems approach to computerizing operations, you are hung by the gills on the computer industry's fishstringer for good. . . ." A case history concludes with: "Even if you could prove that further computerization was diabolically evil, you still could not stop this momentum."²⁶

The most enthusiastic of the extremists revealed their full intent. They claimed, for the "Computer-Tutor," the educational potency of a Socrates. In this, their ultimate totalism—foretold by Ellul—was just as apparent, as in those who, about this same time, were claiming that the computers would take over student counseling before long, and would do a far better job than the human counselors; and that the computers would do the same for student psychiatric services, as well as for "dating and mating." Thus, it often turned out, the enthusiasts talked of temporary professional dislocations and ultimate readjustments that would yield geometrically increased educational dividends for all. They actually envisaged almost total displacement of the human teacher. He might remain as "baby-sitter" to the computer; or through re-training, he could become, no longer the teacher, but the technician—the programmer of the courses that the computer would before long be teaching. Some claim that there is promise of challenging, creative educational careers in programming courses and other such educational agencies. By 1966, in the *American Scholar*, reference was being made to a type of "computer-assisted instruction" which "opens the way to the future of . . . the so-called teacherless classroom."²⁷

²⁶ *Liberal Education* 57, 3 (October 1971), 394, 407. Reprinted from *College & Research Libraries* (May 1971).

²⁷ David B. Hertz, "Computers and the World Communications Crisis," *American Scholar* 35, 2 (Spring 1966), 268.

The Second Look

It was not only among the teachers themselves, however, that this reaction against the superlative claims came. It came, too, within the cybernetics industry, from researchers in computer applications and from the experimental producers of programs in computer instruction, during interviews on 1959 field trips in connection with my researches in the impacts and implications of technological change for the Humanities. For them, pulling back from their earlier bullish mood was a matter both of corporate self-interest and of professional integrity. Knowing the actual state of the art and its outlook, and hence aware of all the difficulties still to be overcome before they had assurance of large-scale programs in computer-involved instruction even at modest levels and with modest goals, these computer professionals were deeply disturbed by the excessive claims of the overzealous educator publicists and, be it acknowledged, of some computer company promoters. These claims violated their sense of reality and seemed naively imprudent. Standing between the extravagant claimants and their own executive superiors, they knew that, before long, there would be a day of reckoning for them and that they would be asked to account for the glaring discrepancies between claims made and actual delivery or actual performance. There would be a day of reckoning, too, vis-à-vis the computer for instruction and the educational world—both of administrators and teachers; and for similar reasons. Finally, there could very well be a wave of disillusionment in the public-at-large—one which would have its effects along the whole growing edge of computer utilization and hence of computer purchase or rental: a sort of cybernational Luddite backlash might be unleashed.²⁸

All in all, this insistence upon taking a second and hard look at the state of the art and the promise of computer-

²⁸ Cf. Malcolm Scully, "Computers, Big in Research," p. 4, where he attributes the "cooling of much of the early enthusiasm about computers for instruction" to the fact that "some of the early programs were egregious failures."

26 Cybernation, Systems, and the Teaching of English

aided teaching should not be regretted. It has led to a realistic adjustment of goals, and hence of sights and claims.

This adjustment has shown itself along several fronts. One of these has been attrition of funds or other support by grant-giving companies, foundations, and government agencies. Another has been the shifting to other frontiers by the cybernational company researchers. A third has been a downward revision in the goals set up for the educator-researchers. This was quite apparent to me in field interviews, during a sabbatical leave in the winter of 1970. One cybernation-company director of research projects put it thus, when, following my visit to his laboratory, he dropped me off at the local bus station: "I'm sorry you've found me in such a Hamlet-mood. I've been in it for some months now, and I'm afraid I'll continue so for several months more. I can't decide if it's worthwhile to make one more attempt—if it's worthwhile to try, once more, to develop programs in computer-involved instruction that will be of more than elementary use, and that will be available at a price the potential purchasers will be willing to pay." Since then, I have noticed a shift, too, in sales frontier for cybernation companies. This is away from attempting to market computer-involved learning programs and toward giving major attention to computer-related systems for museums and libraries.

In the spring of 1970, I heard one of the major contributors to the extremely enthusiastic November, 1967, "There Is a Computer in Your Future" issue of *American Education* present a current project he was directing. It was one in the rehabilitation of prison inmates through systematic educational programs. Significantly—at least to me—no computers were involved in the actual teaching program itself, which was limited to experiment with that mode of operant conditioning known as the "grandma-dessert technique." That is, *eat your spinach and I'll give you your apple pie*. A far cry this, from the earlier pictures of the educational takeover, by the computer, as Socrates-tutor.

It is perhaps too early to assess, for our immediate concerns, RCA's following GE's lead and, in the words of the *Wall Street Journal* headline, "Quitting as Computer Maker" with a "Write-off" that "May Reach \$250 Million" (20

September 1971). According to the *Journal* reporter, Scott R. Schmedel, citing Robert W. Sarnoff, RCA will continue to develop and make computer-based, "specialized data-communications systems for government and defense, communications networks, and business." No mention was made of continuation of its explicit, education-focussed enterprises.

There are strong indications of a stinging backlash, among librarians, to the thrust into their terrain of computer-systems enterprises. (See the already cited "The Great Gas Bubble Prick't; or, Computers Revealed—by A Gentleman of Quality.") In this indictment, Dr. Mason utilizes both the methods of eighteenth century satire and the twentieth century statistical modes. In both of these types of argumentation, Dr. Mason illustrates Samuel Johnson's *Bring all things to the bar of experience*.

A realistic adjustment should make for positive clarifications. It should clearly reveal how, in the computer and in computer-involved systems, there is still a largely untapped source of aid to the teacher; and how truly productive patterns of relationships might be established.

It would seem that one strong reason for the open-armed and overextended welcome that school and government agencies have been giving to computer-involved instruction is that, rightly or wrongly, they have seen in this an effective way of handling multitudes of students with proportionately diminishing teaching staff. The pressure on this front has been somewhat relieved by recent demographic shifts and curtailment of funds; and it is realized that computer-involved instruction by no means comes so cheap as economy-minded administrators at first thought. So, perhaps, all along the line—from Washington through the state departments of education, the district offices, the local school offices, and finally, to the individual classrooms themselves—we have breathing time for steady reassessment, leading to realistic progress of computer-involved systems instruction.²⁹

²⁹ Cf. Anthony G. Oettinger, *Run, Computer, Run: The Mythology of Educational Innovation: Studies in Technology and Society* (Cambridge, Mass.: Harvard University Press, 1969). Earlier Mr. Oettinger did an article on this subject for the *Saturday Review*. (The title is echoed in Dr. Mason's "Run, Rabbit, Run.")

Such reassessment, I am assured, by no means eliminates high hopes for what, ultimately, in teaching, the computer may accomplish. Several years ago, Professor Edward A. Feigenbaum, director of the Computer Center at Stanford University, reported that, already, about one-fourth of the Stanford population were using computers in their work and studies and that each year brought about 1,000 new student users: "Students' use has burgeoned, doubling about every two years." (*New York Times*, 28 June 1966.)

Reassessment does, however, emphasize how hard it is to devise computer-involved programs that successfully handle even the "elementary" types of instruction—those stressing the memorization of information and the development of other standardized mental skills. It enables the application of qualitative criteria to the claim made several years ago that, already, computers were doing at least as good a job of grading essays (not just detecting and registering "mechanical errors," but also of evaluations—for content, style, etc.) as the "human-type" teacher.³⁰

Such reassessment enables the application of the qualitative criterion to the claim that, very shortly, computer instruction will provide "very rich Socratic interaction with students," and "even at fairly high levels." English teachers have a big stake in the outcome of this particular line of critical scrutiny. We have claimed that our courses in literature encourage, within the individual student, the integrated use of perception, feeling, imagination, reason. We have claimed, in short, that we produce the nonstandardized, nonstereotyped individual. Specifically, we have claimed that one of our most effective tools for this sort of learning is the "Socratic method." What happens if the computer allegedly takes over the esthetic-evaluative functions of the reader of student essays, and the ratiocinative-evaluative functions of the leader in the "great Dialogues"—in the "Socratic Dialogue"? To attempt to answer these questions gives us

³⁰Reported on the basis of Professor Ellis Page's experiments at the University of Connecticut, in *American Education* (November 1967), with a wry comment to the effect that one could not tell whether this reflected more the competence of the computer or the incompetence of the instructor.

an index of the importance of discrimination as to what computer-involved instruction can and cannot do now; what it will and will not be able to do within the next five or ten years (through the 1970s); and what it will or will not be able to do in the further-range future.³¹

Robert Redfield and John Wilkinson rescue the term *dialogue* from its current triteness, flatness, looseness of meaning. They restore the dialogue to centrality in the art of civilization, which is but the more generalized form of liberal learning and the teaching of English as a Humanity.³²

Individualization—Individuation

In connection with a critical scrutiny, several things need to be particularly watched. One of them is the debasement of verbal and conceptual coinage when, in regard to computer-involved teaching, terms having rich traditional uses are misleadingly used. Take the word *appreciation*. Historically, it has meant: *to set a value upon*. The term was associated with the critical revolution on behalf of "philosophical criticism," staged by such romantics as Samuel Taylor Coleridge. For him *appreciation* meant a creative response to literature—that is, a unified response of consciousness and sensibility to a whole range of qualities in the work—from individual words and images to a transcending immanent spirit (hence the "philosophical"). It meant a response to these elements, not in themselves, treated analytically and separately, but in their vital relationships with one another.

³¹ Cf. my "Automation, Education and the Humanity of Man" in *Automation, Education and Human Values*, pp. 11-26.

³² Robert Redfield, *The Educational Experience*, Fund for Adult Education, Pasadena, California (April 1955), especially Lecture 2, "Conversation," pp. 24-40, which contains a wide-ranging and illuminating treatment of the educational functions of "The Dialogue"; and John Wilkinson, "The Civilization of the Dialogue," *A Center Occasional Paper II* 1 (December 1968), Center for the Study of Democratic Institutions, Santa Barbara, California. Cf., too, the Fall 1969 issue of *Daedalus*, devoted to *Dialogues*.

Even when people have forgotten the historic context, they still have had a "value factor" in their idea of appreciation. This seems to have been neglected by some of those designing computer-involved teaching programs in literature. One hears of a computer program in "the appreciation of literature." When one asks what *appreciation*, in this context, means, he is told that it consists in getting the pupil to describe and classify the images in a poem on the basis of the sense to which each image appeals. *This is an image of sight; this, of hearing; this, of smell;* and so on. The result is a crude caricature of appreciation. It takes first steps in what might become a full experience of literary appreciation, and makes of it the whole process. It likewise encourages the false notion that an accumulation of analytically extracted facts about the piece of literature equals the appreciative experience of it. The notion of the crucial role of interrelationships among the separate "elements" or ingredients is submerged. The notion of comprehensive literary evaluation is lost. This treatment of the use of the computer in teaching can lace artificially narrow limits around subject matter, the learning processes experienced, and the learning goals to be gained.

Professor Phil Lange of Teachers College, Columbia University, has provided similar illustration of the misuse of terms in connection with computer-involved instruction. He has predicted that, through computer teaching, the American Dream will at long last be fulfilled. He thus gains, for computer instruction, a rich accumulation of sentiment and prestige, transferred to it from the very term "American Dream." True, in recent decades, skeptics have been using the phrase with bitter irony.³³ As they see it, the "American Dream," from the beginning, was an impossible phantasy, or it has turned into an "American Nightmare." Nevertheless, there continues, for many, a heartwarming glow of favorable association around "American Dream." Hence, the

³³ See the National Educational Television series, *The Great American Dream Machine*, now carried into its second year, and already of demonstrated influence on commercial network programs.

phrase still contributes substantially to the prestige of that with which it is associated.³⁴

With what does Professor Lange associate this richly freighted epithet for one of our still functioning American myths? It is the picture of each pupil sitting at his own computer-console, working his program on his own, moving at his own pace, getting, on demand, "personal" attention from the computer. One of the computer teacher's versatile talents, moreover, is providing, simultaneously, such personalized attention to each of hundreds of pupils based on "his" cumulative record of each of the students' accomplishments and failures. Even so, before we accept this as actually providing for the individualistic development of the pupil, we must make several important distinctions: (1) to personalize is not necessarily to individualize; (2) to individualize is not necessarily to contribute to the making of an individual or to encouraging individualism.

In critical scrutiny of the state of the art of computer-involved teaching in English classes, also of its promise—another term is to be carefully considered. This is the term "individualization." The similar term "individualism" is still regarded, in American educational circles, as designating a highly desirable thing. Certainly, the enthusiasts for computer-involved instruction have taken hold of it, and have used it as one of the central justifications for their high claims for computer-involved education.³⁵

Historically, there have been at least three main sources of this idea of individualization in American education. One of these derives from the Hebraic-Christian tradition—with its stress on the sanctity of the individual. A second is what Goethe has called "The Significant Individual." The third is the liberal-democratic tradition enshrined in the great

³⁴ Cf. Blakely, *Toward a Homeodynamic Society*, pp. 24-30: "Democracy is a superior form of government because it gives to all people the educative freedom and responsibility to discover and develop their capacities through taking part in deciding and creating what they should do and become, individually and together. It matters very much to an individual whether he is enlarging his humanness by playing his role as citizen in the conduct of public affairs."

³⁵ Cf. Patrick Suppes, "Plug-In Instruction," *Saturday Review*, 23 July 1966.

American myth—"The American Dream." This is exemplified, generally, in the cult of the "rugged individual," and in progressivist education.

A prototype of the second kind of individualism is Socrates: whose motto was *Gnosce teipsum*—"know thyself," and who, in vindication of his autonomy, preferred death to life. His very method and manner of exercising this preference demonstrated his individualism. In view of this long association of the name and the figure of Socrates with staunch individualism, it is not surprising that, in their own emphasis on computer-involved education as individualizing education, the enthusiasts connect Socrates with their cause. They thus gain for their vigorously urged "individualizing" program of education by computer, the accumulated traditional prestige associated with the name "Socrates," and with "the Socratic method." When combined with "tutor," these suggest the aristocratic, the elitist—the "quality education" of the private academy, the ivy league college, the Oxbridge tradition.

Actually, we need another term to describe a process where, regardless of its contribution or lack of contribution to individualism, personal attention is given and received. For this, I propose the term *individuation*. This does not necessarily produce individualization of character and personality; nor does it necessarily advance the cause of individualism. Indeed, it may lead to the breakdown of individuality—its total erosion or pulverization. Brainwashing is illustrative.

This possibility needs to be kept to the fore, especially in regard to the teaching-learning theory on which the computer-involved program is set up, and in the context of which it is presented. There seems to be a natural affinity between computer-instruction rationale and mechanistic, behavioristic teaching-learning theory. Indeed, Professor Bertalanffy has gone so far as to insist that such learning theory in a behavioristic-mechanistic psychology leads to the "robot model" of the learner.³⁰ It is, therefore, not surprising to find Professor B. F. Skinner asserting that "the teaching machine through operant reinforcement can often teach bet-

³⁰ *Organismic Psychology and Systems Theory*, p. 51.

ter than teachers."³⁷ A mechanized teaching-learning instrumentality is of a piece with a mechanistic view of the teaching-learning process and of the learner as, himself, a stimulus-response mechanism. Hence, too, it is not surprising to find that, in developing his picture of the university as a totalistic information-processing operation and of the computer as master tutor, Dean Gerard defines education as "an effort to organize the experience to which an individual is exposed so as to develop a maximal change of behavior and capacity along certain lines."³⁸

Similarly, it is not surprising that, in emphasizing his belief in the importance of computer teaching as a means of realizing, in our mass society, the individualism cherished in the American Dream, Professor Lange connects this with Skinnerian behaviorism. Indeed, he has hailed Professor Skinner as the greatest American teacher—if not the greatest teacher of all time; and, as a prelude to his own enthusiastic depiction of computer-teaching, he has shown the famous film of Professor Skinner's experiments in the radical conditioning of pigeons. Several years ago, Professor Lange showed this film at a 1965 annual conference of the Department of Supervision and Curriculum Development of the Pennsylvania Education Association. At the conclusion of his presentation, he was given an ovation.

For a monograph-length attempt to reconstruct the teaching of composition according to Skinnerian principles, see Robert Zoellner, "Talk-Write: A Behavioral Pedagogy for Composition," *College English* 30, 4 (January 1969), 267-320; and for discussion and debate, see subsequent issues of the same publication. To give so much space, in a single issue, to the writing of a single author was so exceptional as to call for a special note of justification by the editor. In personal talk, Professor Zoellner has assured me that a close reading of his text will show that he is by no means an absolute disciple of Skinner.

³⁷ Cited by Farrell, *English, Education, and the Electronic Revolution*, pp. 20-21. Cf. Burrhus F. Skinner, *The Technology of Teaching* (New York: Appleton-Century-Crofts, 1968); and "Foreword," *Technology and Innovation in Education* (New York: Praeger, for Aerospace Foundation, 1969).

³⁸ *Symposium II*, p. 50.

Mention of this is made not with the intention of immediately challenging the Skinnerian radical behaviorism, but rather to emphasize the need of constantly and critically scrutinizing the claims made for computer-teaching. Whatever such teaching may do under the stimulus and with the authority of Skinnerian behaviorism, it by no means necessarily or automatically contributes toward realization of that individualism which is central to the American Dream. My hunch is that Professor Skinner himself would be the first to admit this. (As brought out in the epilogue to this paper, my hunch, much to my deep concern, has been overwhelmingly confirmed.) He has flatly stated that he places no intrinsic value on ethical or social ideals as such. He regards them merely as possible means for achieving the behavioristic manipulations he happens at the moment to be practicing toward his desired outcomes. More than that, consider the very basic image that he has of the human being—as one easily reduced to plasticity, pliability, malleability—to being manipulated this way and that, in accordance with the wishes of the controller. This putty image is, on the face of it, and however benevolent the controller may be, inimical to that individualism which is so integral to the American Dream.

Such individualism is symbolized and at least partly actualized by Henry David Thoreau, and it is celebrated in his *Walden*. There is, then, far-reaching irony—whether intended or not—in Professor Skinner's entitling his portrayal of the ideal community and way of life as *Walden II*.³⁰ For *Walden II* depicts an authoritarian community under total control of a Skinnerian behaviorist psychologist-philosopher-king. It is made up of members out of whom all individualistic elements have been leached. In the case of those born within the community, this leaching process starts before birth. It is applied to the fetus. Like Tennyson's "mild-eyed, melancholy lotus eaters," the dwellers in *Walden II* live lives of utter nonindividualization. For such, the very idea of individualism would be incomprehensible, let alone motivational or inspirational. If one talked about it to them, he would get a blank stare.

³⁰ B. F. Skinner, *Walden II* (New York: Macmillan Company, 1960).

Education, Ecstasy, and Control

It is worth noting that George Leonard pays highest tribute to B. F. Skinner and his behaviorism.⁴⁰ Mr. Leonard points out how, in *Behavior of Organisms*,⁴¹ "politely ignored for more than fifteen years," Skinner "never wavered for a moment in his view that all behavior must be ultimately predictable, controllable, and therefore improvable." In such citation, Mr. Leonard makes at least one assumption that bears directly on our immediate point. The criteria of improvement and the methods adopted are crucial. He assumes that the controllers will be of his own type—warm-hearted and big-hearted; and that the improvement of behavior they will be able to engineer will be toward changes that he [Leonard] would regard as desirable. This is in keeping with his professed Rousseauistic idyllicism and natural goodness sentimentalism. It ignores the painful anxiety of such authorities as Donald Michael, author of *Cybernation: the Silent Conquest*,⁴² and of Norbert Wiener himself, father of cybernation. This is anxiety that John K. Galbraith's post-industrial, technocratic-bureaucratic elite, David Bazelon's "New Class," Daniel Bell's *dirgeants*—the predictor-controllers, will lack the wisdom, compassion, devotion to justice that Mr. Leonard and his fellow sentimental-ecstasies assume.

From 1964 on, in personal meetings with him and when we shared the public platform, I urged Dr. Michael to address himself to finding ways of allaying this anxiety. Dr. Michael eventually did devote major attention to this crux—in his *The Unprepared Society: Planning for a Precarious Future* (New York: Basic Books, 1968). In this book, the education that he arrives at for the future technocrats is not far from that proposed by Plato for the élite of his *Republic*. Whether or not one accepts Dr. Michael's proposal, one is

⁴⁰ Leonard, "The Human Potential" in *Education and Ecstasy*, pp. 40-42.

⁴¹ Burrhus F. Skinner, *Behavior of Organisms: An Experimental Analysis* (New York: Appleton-Century-Crofts, Inc., 1938).

⁴² Donald Michael, *Cybernation: the Silent Conquest* (Santa Barbara, Calif.: Center for the Study of Democratic Institutions, 1962), 47 p.

appreciative of the thought and the emphasis he has given to this most crucial problem. This now especially concerns our thoughtful youth, as was evidenced in a recent discussion, during a college freshman class, of Buckminster Fuller's *Utopia or Oblivion*.⁴³

It is significant that, in referring to *Walden II*, Mr. Leonard dismisses it as "a novel about a rather dull utopia, where behaviorial techniques are used to achieve pastoral, nineteenth century ideas of happiness and community." Actually, *Walden II* gives us a model of what, from his own point of view, Professor Skinner projects as the outcome of the very process that Mr. Leonard so enthusiastically urges: the application of Skinnerian behaviorism to the predictive control of human behavior. Leonard tastes: and rejects the pudding. It is not the dish that his sentimental, primitivistic, optimistic recipe has called for. It lacks the raisins and rum of excitement and ecstasy.

Let us assume that Leonard's projective picture does come true—that the predictive control does produce the orgiastic celebrant—leaping from peak to peak of ecstasy. Even so, if achieved through predictive control however well meant, it does not make for the autonomous individual celebrated in the Emersonian-Thoreauvian models. It sharpens the dilemma of control that heads the agenda in connection with the promises and pitfalls of learning systems in the teaching of English. The dilemma becomes all the more critical when we realize the depersonalizing threat in the simplicism and reductivism necessary to the Skinnerian techniques of control that Mr. Leonard so admires.⁴⁴

We may see this simplicism and reductivism in Leonard's identification of the essence of the Skinnerian organon: "Essentially, what it has done is strip the behavior of living things down to the bare bones. . . . In a series of experiments with rats back in the 1930's (since corroborated with other animals, including men), he found a way to predict, measure, and control the actions of living things, in some

⁴³ R. Buckminster Fuller, *Utopia or Oblivion: The Prospects for Humanity* (Toronto, New York, London: Bantam Books, 1969).

⁴⁴ Cf. E. J. Farrell, *Deciding the Future*, pp. 96-97, for a discussion of this matter of control. In it he cites my "The Structure and Problems of Human Values: 2000 A.D.," *Symposium II*, pp. 77-78.

cases with the precision of a physicist dealing with matter and energy."

One of the four "vignettes" making up a *Time* front cover-page picture feature on Dr. Skinner shows his pigeons at their ping-pong game (20 September 1971). The caption, in yellow boldface on a field of steel-blue, reads: "B. F. Skinner says: *We Can't Afford Freedom.*" The balancing vignette for that of the pigeons at ping-pong shows a rat in the process of experimental conditioning. Each of the vignettes is placed at one of Dr. Skinner's temples. This cover-page picture provides a companion piece to that for the *Time* issue of 12 April 1965, which depicts a voracious humanoid robot with hominuli—humbly, if not abjectly—devoted to its care and feeding. For another *Time* front-cover page depicting man as being controlled, see the issue for 18 April 1971. This carries the caption: "The New Genetics: Man Into Superman," and it shows a man and a woman enmeshed in their tape-like double-helix genetic codes.

John Poppy's "Sullivan's Crusade: Schools Without Pain" deals with California educator Dr. Maurice Sullivan, as representative of those "who have discarded murky Freudian metaphors in favor of direct observation, prediction, and control of human behavior." As Dr. Sullivan bluntly puts it, they base their teaching on the operational formula that any "organism—rat, worm, sophomore—does what it is reinforced for." For them: "Reinforcement is the big word. It can be roughly translated as 'reward.' Behavioral psychologist B. F. Skinner has shown that your tendency to repeat an action depends on whether you are rewarded—reinforced for doing it earlier. Reinforcement can be anything pleasing to you: food, money, praise, a smile, or simply getting the right answer and feeling good." (*Look*, 28 June 1966.)

Physicists often claim theirs as the "classical science," the "purest science" precisely because the phenomena it investigates are most nearly free of the nonmeasurable, uncontrollable factors in other scientific fields. From this, one might conclude that behaviorism deals with the aspects of the personal enterprise which it shares with those phenomena

farthest removed from our "humanness." It should be added that, in their dealing with microphysical phenomena, the physicists themselves have admitted that they must modify their classical claims. In this connection, it may be noted that Dr. R. Louis Bright, formerly with Westinghouse research laboratories, who, as USOE's associate commissioner for research, made some of the most inclusive claims for the computer as tutor-teacher, is now professor of physics (at Baylor University). In fact, some of the totalistic claims cited in the present paper are to be attributed to Dr. Bright.

At the levels of microphysical phenomena, even matter and energy are wayward and misbehave, and hence are not susceptible to be dealt with in the modes of classical physics. Jacques Barzun has characterized the Humanities as the "Misbehavioral Sciences."

Mr. Leonard does not seem to realize that the simplicism and reductivism necessary to the Skinnerian control replace the complex reality of a human being with a grotesquely reduced and simplified machine caricature—what Professor von Bertalanffy has called the "Robot Model of Man." In this last reference, we have come full circle. We have a robot model for man to match the robot function of the computer as teacher.

Systems Teaching and Behavioristic Control

Although they may sometimes use the scientific method, English teachers traditionally have argued that they are humanists not behaviorists. This stance is almost anachronistic, now that the Bureau of Research in the U. S. Office of Education has committed a substantial share of its budget to the commissioning of taxonomies of behavioral objectives in all major disciplines and the refinement of these taxonomies in seventeen large, cooperative school systems. It is a hard stand to justify in California now that every school system and individual school is charged with framing in behavioral terms the outcomes of its courses, with measured approximation of these goals one instance for justifying state

support of the local school.

A major section of Robert Hogan's banquet address⁴⁵ at the 1969 fall conference of the Pennsylvania Council of Teachers of English was devoted to numerous illustrations of the pressure being exerted on English teachers to produce lists of behavioral—that is, measurable—objectives for their courses. He soundly pointed out the simplistic and reductivist impact of such pressures if successfully exerted. The first impact is that, since it provides more “tangibilities” that are measurable, the *oral-written* communication sector of English teaching is moved to center-stage; and even here, the nontangible outcomes tend to atrophy. The second impact is that only those features of the teaching of literature survive which can be quantified. Of the positivistic tendencies in utilitarianism, it is largely a matter of *out of sight, out of mind*. So, too, with the “intangibilities” in competition with lists of behavioral outcomes. As an example of what does happen when people are forced to produce behavioral outcomes for English teaching, Mr. Hogan cited something like the following—drawn up tongue-in-cheek—for ninth-year expository writing: *approximately ninety-five percent of the students, ninety-five percent of the time, should be able to write a five-sentence statement for a future expository paper.*

Mr. Hogan pointed out that the pressures for reducing the English teaching efforts to behavioral outcomes was due to the desire to use such lists of outcomes, in the future, (1) to determine the teacher's degree of professional success as a basis for retention, salary increase, promotions and the like (performance contracts; accountability); (2) to determine what to retain and what to drop in the curriculum; (3) to determine budget allocations (i.e., cost-effectiveness). What Mr. Hogan did not explicitly mention yet what, I am certain, from subsequent talk with him, he had in mind, was

⁴⁵ “The Future of the Profession.” Later published as “Postscript: The Future” in *English Education Today*, eds. Lois S. Josephs and Erwin R. Steinberg (New York: Noble and Noble, Publishers, Inc., 1970): Reprinted with additions from *ADE Bulletin* (September 1969) by permission of the Association of Departments of English. Mr. Hogan is the executive secretary of the National Council of Teachers of English.

that the development of a set of behavioral outcomes happens to be a prerequisite for the consequent shaping and installation of computer-involved teaching programs. In fact, the cause of the absence, from the conference at which Mr. Hogan spoke, of at least one English department head was that she and the other members of her department had to work at a list of behavioral outcomes to be used for constructing programs for computer-involved instruction about to be launched in their college.

In this consideration of the computer in the English classroom, I have purposely gone light on details of hardware, software, and the like. I have little worry about the profession's vigorously taking hold of the gadgeteering phases of computer teaching. We are a nation of tinkers, and our teachers are an enterprising part of our citizenry. Their relative slowness to commit themselves to computer-involved instruction may make the sellers of computer hardware and software impatient. But, for reasons that have already become apparent, I do not regard that as, in itself, regrettable. The lag gives us a chance for the third look and the sober reappraisal. Part of this lag has been due to the circumstances that the production of "hardware" ("gadgeteering") has run far ahead of the production of "software"!

My concern is, rather, with the appropriately critical yet constructive handling of this gadgeteering gift. I have tried to suggest the grounds for emphasis on the need of such criticism, and I have tried to indicate one or two of the important *loci* for this. I have done so, not because I am an intellectual or pedagogic Luddite, but precisely because I want to make sure that we gain the greatest good of what—with the possible exception of the laser—seems the most versatile technological instrumentality—the computer. This has been declared to be, still, hardly out of its swaddling clothes. It was in his speech celebrating the twentieth anniversary of the birth of this prodigy—in the form of the now famous Univac at The University of Pennsylvania (1946)—that General Sarnoff of RCA so characterized the computer.⁴⁶

⁴⁶ Cf., too, Mr. Kemeny: "We are still very much in baby shoes at the art of how a man-machine complex operates as a team" (Malcolm Scully, "Computers, Big in Research," p. 5). Some move this birth-year back from 1946 to 1945 or even to 1942.

On the same occasion, General Sarnoff declared that the computer would "leave no life untouched." He added, however, that, while its potentialities for good were immense, its powers for ill, if misused, could be catastrophic. (Cf., too, Dean Jerome Wiesner of MIT and other scientific-technological authorities.) The intent of my paper has been to make a contribution—however modest—toward insuring the maximum good and reducing to a minimum the potential for ill in the computer as it comes into our English classrooms.

Such computer enthusiasts as Mr. Leonard themselves recognize the double-edged nature of this precocious technological instrumentality. Thus, he declares: "Cybernation, pervasive and instantaneous communication devices of increasing speed, range, and sensitivity extend and enhance men's sensory apparatus, multiplying the possibilities for understanding the ecstasy as well as for misunderstanding and destruction. The times demand that we choose delight." Also: "Far from decrying and opposing an onrushing technology [this reform of education] sees technology as an ally, a force that can as easily enhance as diminish the human spirit."⁴⁷ During the past several years, in connection with work on a book on impacts and implications of technological change for the Humanities, and in connection with assignments in the Danforth Distinguished Visiting Lecturers Program, I have visited a number of west coast colleges and universities. Often, enthusiasts have urged me to follow their lead and make *Education and Ecstasy* my educational bible. Few have seemed to realize that the heady brew Mr. Leonard has concocted is a rewarming of Rousseau's sentimental primitivism; and that, centuries before, it had been most critically exposed in the *Bacchae* of Euripides. While claiming to be so future-oriented, it is at heart, or in its guts, a revival, a recrudescence of the Dionysianism so well depicted and anatomized by the astute Greek dramatist-psychologist. It is Dionysianism—electronicized and rendered psychedelic—an odd three-way cross: Pan, Pegasus, and Technetronic Horse—a new kind of Centaur, or Gryphon or Unicorn or a new Bellerophon?

⁴⁷ *Education and Ecstasy*, pp. 15, 17.

1969: Educational Technology Business: Reappraised

I received, out of the cornucopia of junk mail, a piece that should here be noted. When unfolded, it showed itself to be a giant poster measuring 22 × 33 inches. It announced a forthcoming conference at the University of Chicago on the "Reappraisal of the Educational Technology Industry," sponsored by the Urban Research Corporation. It was to run for three days. The conference fee, which included accommodations, was \$315. It was addressed to "corporate planners and project directors in technology industries, editors of instructional materials, and textbook salesmen." Among the featured program dialoguists (there were to be no set speeches) were Marshall McLuhan, Francis Keppel, Ralph W. Tyler, John Brademas, Sterling McMurrin, and R. Louis Bright. What was the purpose? It was "a critical reappraisal of the educational technology industry, a reappraisal which will lead to constructive utilization of resources." A number of the topics dealt with had to do with nuts-and-bolts, bread-and-butter ways and means—with the "rationalizing" and marketing aspects of the educational technology business. But this was not what was stressed in the statement of purpose:

Some observers see an inherent tension involved in any link between business technology and education. Any failure to produce results is interpreted as being caused by the 'incompatibility of life styles.'

This statement bears very directly on the main intent of the present paper. To expose this bearing, one has to do some paraphrasing. Through characteristic efforts to avoid direct confrontation with socio-ethical values and issues, the framers of the statement of conference objectives aestheticized the whole business: they reduced it to a matter, not of conflicts of values, but of "incompatibilities of life styles." The present paper has tried to clear the air of aesthetic euphemism and to force to the fore the fundamental values issues that should be more explicitly faced and frankly ex-

amined. It has tried to show that these value-fraught issues run the whole range from *Lebensgefühl* (feeling about life) to matters of ontology and epistemology, with the middle range of social values in between. The educational technology industry, and those in government and education who are already sold on what the industry wants to push, must come to realize that the sales resistance in many teachers and administrators is due to something more than life-style uncongeniality, rear-view mirror driving, tunnel vision, or just being stuck in the reactionary mud or concrete. Until the educational technology projectors and promoters face and try to answer the basic psycho-social, psycho-ethical *normative* challenges being directed to them, they will continue to experience hard resistance to what they want to sell; and such resistance, to my mind, is intelligent. It is prudent and large-visioned. It is to the credit of the teaching profession.

Among other things, such resistance ought to register deep concern about the giant poster that advertised the Chicago conference on "Reappraisal of Educational Technology Industry." Most of the poster was taken up with a picture of two pullover-garbed boys, with enigmatic, almost Mona Lisa, expressions on their faces. Superimposed on each of the sweaters, approximately over the heart, was a valentine-like image of a heart. Each of these was punctured in a number of places—with the perforations of a computer punch card. Marshall McLuhan, spokesman for technetronic circuitrists, has told us that "The Medium is The *Massage*." What, then, is the "massage" of this big poster picture—with its cardiac montage? That, thanks to computer-systems teaching, we are at last going to make our teaching creatively "gutsy"—bypassing the cerebral areas, especially the cortex? That teaching is once more going to be "heart to heart" via computer—*cors ad cors loquitur* via Fortran or whatever is the latest computer language? Or does it mean, on the contrary, that computer-systems teaching is going to externalize our students and to force them to wear their hearts, if not on their sleeves, at least on the bodies of their pullovers; and that, so worn, these hearts are to be perforated and punctured by the computer-tutor?

This message rubs me—if not the wrong way, at least more than one way—ambiguously. And this ambiguous response simply confirms the urgency of our addressing ourselves to the normative issues with which the present paper has been chiefly concerned.

Now, in 1972

Much of the preceding discussion has treated of computer-involved learning with little explicit stress on such learning as expressive of a system. In great part, learning the systems component of our subject implicit has been due to recognition of the truism: if the part does not work or is otherwise wanting, then any whole into which it might be integrated would suffer from its faults or failures. It is time, now, however, to return, explicitly, to consideration of learning systems and the teaching of English, the subject originally assigned to me. Here we may sum the matter up thus. First, the computer itself may be both organizing principle and comprehensive implementing agent for a learning system. We have seen this in the "mainline approaches" to computer-involved learning. This is, quite technically, a system in which an entire course is organized ("rationalized") around the computer rather than the teacher.

As with other modes of computer-involved learning, when mainline approaches were proposed, "many people lauded them as a revolution in instruction." Yet, also as with other modes of computer-involved learning, "the ardor has cooled."⁴⁸ In part, this has been due to the discrepancies between the goals set and the present capabilities of the instrumentalities; in part, to the serious limiting factors of costs; and, in part, to the emergence of unanticipated and negative side-effects. One of these has been the same sort of anomie that "baby-sitters" for numeric-control processes in industry have experienced through deprivation of human contact and companionship. Another, reported by B. F. Skinner, has been

⁴⁸ Malcolm Scully, "Computers, Big in Research," p. 4, citing Professor Victor Bunderson, University of Texas.

emotional atrophy or "freeze" on the part of those who have completed this sort of learning program. A third, likewise reported by B. F. Skinner, has been the lack of ability to learn except through the mediation of the computer system. These factors, in turn, have contributed to the already treated doubts, misgivings, and anxieties of many in the face of the seemingly inescapable teaming up of computer-involved learning systems with behavioral objectives, themselves regarded as inimical to learning as growth toward individualized and individualistic maturity.

There is another sense in which the systems concept may be applied to computer-involved learning. This holds a composite model, in which the computer is but one component of a dynamically interrelated and interacting whole made up, in addition to itself, of learner and total teaching-learning environment, including other modes of learning—such as books, audio-visual aids, and, especially, of fellow pupils, teacher, and administration. It is in this less exacting and in this eclectic sense, for example, that the Westinghouse learning center has been providing full learning programs, each tailored to the specific needs and capabilities of the institution and classroom situation in which it is to be used.

According to this eclectic sort of learning system, the amount of time the pupil devotes to solitary communication with the computer is carefully limited; and a great deal of the teaching occurs socially, with fellow-pupils and in direct teaching-learning relations with the teacher. Thus cybernetic anomie is neutralized or prevented. To this sort of learning system, as in other learning programs where the computer is only a partial teaching instrumentality, the term "computer-aided instruction" may be accurately applied. Since, to date, the "mainline approaches" to computer-involved instruction have fallen far below the earlier expectations that enthusiasts held for them, we may look to "adjunct approaches," in which the computer is but one item in a varied repository of resources—of personnel and material—that the course developer will utilize. This will hold, it seems, especially for learning systems that may be adapted to English teaching. As to other than eclectic or composite

46 Cybarnation, Systems, and the Teaching of English

learning systems in English teaching, it would seem that even such ardent computer proponents as Mr. Kemeny now advance quite modest claims. Mr. Kemeny recalls that "a great deal of publicity appeared several years ago about how tremendous the computer would be and that it was going to replace the live teacher and do much better." He then bluntly states: "I do not believe this." "The computer," he flatly asserts, "is a poor substitute for a teacher."⁴⁹

Even if one adopts such a conservative attitude toward computer-involved learning systems, one should keep watch on the general vector thrust of learning systems as closely locked into behavioral objectives and Skinnerian mechanistics. In his "Human Engineering in the Classroom," James R. Squire has reported that, at least for the moment, "the national fixation of American education appears to be the delineation of behavioral objectives." He has gone on to say:

... This emphasis is the hard core center of the "Schools for the Seventies" project in elementary and secondary education; it permeates instructional planning in our many states, particularly if federal support is envisioned. It is the essential ingredient in all the attempts to create individually prescribed instruction—IPI—and it is the central concept of the new National Assessment of education currently swinging underway in the United States. In short, this approach to instruction, to curriculum planning, and to the evaluation of learning is clearly bidding to be the major curriculum thrust of the next few years.⁵⁰

Mr. Squire then makes the connection that is so serious for the future of English teaching—that between the powerful drive for behavioral objectives and computer-involved learning, learning systems generally viewed, and the comprehensive systems movement in education—as in industry, civil government, and defense:

... Call it operations analysis, systems analysis, programmed budgeting, cost effectiveness, performance specifica-

⁴⁹ Malcolm Scully, "Computers, Big in Research," p. 7.

⁵⁰ James R. Squire, "Human Engineering in the Classroom." Speech given at the third annual conference, Canadian Council of Teachers of English, Winnipeg, Manitoba, August 1970.

tion, or behavioral objectives—all fall broadly within the behavioral engineering (or human engineering) styles of social policy formulation. And all of the American federal agencies that deal with people problems are trying desperately to utilize with profit the techniques that have proved so useful in designing moon shots, bombs, antiballistic missile systems, and bacteria warfare capabilities.²¹

In accounting for "the popularity of the systems approach to educational (or any kind of social) planning," Mr. Squire puts into more specific terms the "simplicism and reductivism" already referred to in the present paper. As "one primary reason" for this popularity, Mr. Squire offers "the fact that it is an approach susceptible to reliable assessment, to ready evaluation." Add "quantification" to this description, and you see the connection with simplicism: by omitting all but what can be numerically represented and totalled up, one greatly simplifies the process of assessment. By specifying, in advance, and in terms amenable to quantification and calculation, what the learning process attempts, one practices reductivism: "It is necessary only to see how well one has achieved the solitary goal in order to judge the effectiveness of the program." Consequently, programs are "pressed which are most amenable to accountability." Reactions are correspondingly simplistic and reductivist: "If the effects of any program are difficult to measure, there then seem to be good reasons to question the desirability of the program," and "outside financed support through state and federal funds will be difficult in coming." This last is reductivism with a vengeance.

Another sort of reductivism is involved. This destroys a curriculum that has the inclusive wholeness of an organism, made up of vitally interrelated and interacting parts, and of total worth greater than that of the arithmetic sum of its parts. It dissolves the vital whole into analytic aggregates of pellets or packets of learnings for achieving "discretely targeted goals": "perceiving a particular phonemic-graphemic relationship, for example; or developing the ability to scan a poem of a certain order of difficulty; or writing a sentence utilizing a subordinate adverbial construction."

²¹ Squire, "Human Engineering in the Classroom."

It seems that this would be difficult to evaluate in terms of behavioral objectives. For example, in view of the historic mixture of systems of scansion for English verse and, to this day, the lack of anything like standard procedure, a number of equally tenable scansions—especially, for the complex versification in so much memorable poetry—may be legitimately urged.

For an example of the difficulties of setting up "objective criteria" for evaluating human process experiences that are intrinsically impalpable and hence resistant to quantification, see Alvin Toffler's "The Art of Measuring the Arts."⁵² This at times seems a grandiose and grotesque satire in the style of Swift's *A Modest Proposal*. It comes close to pushing its fist through the positivistic empiric, measurable wall when it finally advances the concept of "surrogates of quality."

On such "human engineering," with its goal of quite predictable, standardized "products" that match "performance specifications" like those in manufacturing, Mr. Squire pronounces negative judgment. He does so not on philosophic grounds or on grounds of principle, but rather from operational considerations: "Now the basic danger that I see in all this attempt is that it simply will not work." That is, it will not work if "one conceives the purpose of education to be the cultivation of the intellect and the development of human sensitivity." The reasons that Mr. Squire gives for his negative judgment about the behavioral objectives drive are: (1) in the name of "expressiveness, permissiveness, and romantic vision; even . . . the more hedonistic elements" of life, students rebel against this engineering; (2) it is impossible to identify in operational terms *all* of the objectives for which we strive; (3) the identification of objectives is never complete inasmuch as new objectives are constantly emerging; and (4) it is difficult to identify certain objectives at all. Among these are affective or emotional

⁵² *Journal of Aesthetic Education* 4,1 (January 1970), 69-72. For a brief summary of quite specific "Controversial Issues Regarding Behavioral Objectives," see Robert J. Kibler, Larry L. Barker, and David T. Miles, *Behavioral Objectives and Instruction* (Boston: Allyn and Bacon, Inc., 1970), pp. 23-27.

learnings; learnings that are long-term in effect—such as skill in writing an extended piece of effective prose; the concept of coherence as to rhetorical effectiveness in argument; drawing out inferences and implications; awareness of legitimate outcomes alternative to those that have been programmed; ignoring cumulative side-effects—both desirable and adverse; loss of spontaneity; loss of opportunity to take advantage of Professor Havighurst's "teachable moment," and other phases of creative pedagogic opportunism, as well as of shifting classroom ambience.

A major deficiency that Mr. Squire sees in the application of the behavioral objectives methodology to English teaching is what he calls its "blindness to considerations of value"—particularly "the essence of our programs in literature"—namely aesthetic and ethical values. Finally, for Mr. Squire, there is the danger that "rigorous attention to elaborately preordered tasks will provide children with few opportunities to make choices independently of the system, with few opportunities to express bold reactions against the system, with few opportunities to tune out the system, even for a short time."

In voicing this danger, Mr. Squire, in his own way, has come to our master dilemma—namely, the dilemma of control. This is inherent in the systems approach. It is so whether the concern is the life of the person or family, the man on the job, the citizen in the community, societal endeavor; or whether the concern is education comprehensively viewed, or computer-involved teaching, or learning systems as applied to English education. For, as Ellul has insisted concerning *la technique*, so with systems theory, systems science, systems technology, systems analysis, and systems operations: it has, by its very nature, as Mr. Squire has so variously illustrated, a totalistic impetus. The ultimate danger, here, is that this totalistic impetus may eventuate in totalitarian control. This is why, throughout the present paper, there has been an insistence upon considering the question of learning systems and English teaching in its larger context of comprehensive systems emphasis in education and in society.

In his discipleship to B. F. Skinner—if not in outright

idolatory of him—George Leonard several years ago ignored this master dilemma of control. In his earlier cited *Education and Ecstasy*, he simultaneously celebrated education as a continuous process of releasing the ecstatic self-expressiveness of the individual student and paid highest tribute to Skinner's learning theory as linked with operant conditioning, behavioral objectives, and comprehensive cybernational systems control. He apparently did not realize that he was thus impaling himself on the horns of the master dilemma of autonomy and control.

Several years ago, Mr. Leonard may have been excused for this blindness—which might well turn out to be a tragic flaw. The same may be said for other disciples of Professor Skinner who have simultaneously professed devotion to the autonomy of the individual, and to freedom and dignity. For Professor Skinner, perhaps, had not yet fully and irrevocably declared himself. Indeed, in a book published in 1969, he seemed still to affirm some sort of idea of human dignity. Writing on "Utopia as an Experimental Culture," Skinner reiterated his stand that a "scientific analysis of human behavior and of genetic and cultural evolution cannot make individual freedom the goal of its cultural design. The individual is not origin or source. He does not initiate anything." "Nevertheless," he continued, "a species has no existence apart from the people who practice it." Hence, he continued, "if by *man* we mean a member of the human species with its unique genetic endowment, its human nature, then man is still the measure of all things." In a footnote, Skinner added that he then had in preparation a more detailed analysis from this point of view, of "freedom and dignity."⁶³

Designated as Professor Skinner's *Summa* (shades of the Angelic Doctrine), heralded by numerous advance notices and summaries, and accompanied by its author's personal appearance on such national network television programs as *Today*, this more detailed analysis of freedom and dignity is now fully in the public domain, and under the title *Beyond Freedom and Dignity*. (For further references and publish-

⁶³ *Contingencies of Reinforcement: A Theoretical Analysis* (New York: Appleton-Century-Crofts, 1969), pp. 48-49.

ing information on *Beyond Freedom and Dignity*, see page 55.) Like Buckminster Fuller and other systems engineers of what they call our "Spaceship Earth," Skinner insists that the only way we can save mankind from our present collision course with catastrophe—the catastrophes of mor-dant ecological pollution, urban decay, population explosion, and the ever-present threat of destruction through nuclear holocaust—is through turning ourselves over to technological controllers. According to Skinner, "What we need is a technology of behavior control. We could solve our problems quickly enough if we could adjust to growth of the world's population as precisely as we adjust the course of a moon-ship." To this end, Skinner argues, "Men must be induced to like controls—to like controls more than they like free-dom." They must also be made willing to give up the no-tion—in his opinion false and "stupid"—that man is essen-tially "a creature possessed of free will, capable of making independent judgments."

I find small satisfaction in the definitive documentation that *Beyond Freedom and Dignity* provides for my 1969 admonitions about Skinner's psycho-mechanistics as allied with his gifted contributions to his self-styled "technology of behavior control." Yet I do have a sense of relief in the service Professor Skinner has rendered by clearing the air of the clouds of adulation and temporizing apologetics by which his uncritical admirers and followers have obscured the bare peaks of his ultimate doctrine. He now makes it unequivocally clear that the authoritarian potentialities in behavioristic learning systems are of a piece with his com-prehensive deterministic philosophy or ideology; and that the fulfillment of these potentialities, albeit enveloped in his residual humanitarianism and personal kindness, is an autonomy-denying, freedom-denigrating, dignity-perverting totalitarianism. It is the ultimate technocracy—the virtually absolute domination of the many by the technologist of be-havior control.

Since cybernation plays so central a role in this process, it is particularly pertinent to recall that *cybernetics* comes from a Greek word which means *helmsman*, *steersman*—that is, *controller*. In short, in *Beyond Freedom and Dignity*,

we have stark corroboration of Norbert Wiener's own anxiety, which deepened in his later years, that the future masters of the science and art of communication and control, which he launched, would lack the wisdom, the devotion to justice, the compassion for exercising their powers of control on behalf of personal and human dignity. It has thus been made clear that, in gauging the Skinnerian impact and import, we can no longer practice that dichotomy so congenial to his followers—of hailing the mechanical and psychological inventions of his inspired tinkering and gadgeteering, even while they dissociate themselves from the totalitarian potentials within his over-arching ideology. It has thus been made clear that, if we are properly to assess Skinnerian behaviorist learning systems, we must see these in explicit relationship to the master's own self-styled comprehensive "technology of behavior control."

One of the results should be our putting ourselves to school with those General Systems theoreticians and practitioners who, now for some years, have been advancing scientifically, experimentally based antideterministic images of man. These affirm the validity of faith in telic or end-purpose models featuring autonomy, freedom, dignity as potential and potent realities. Far from dismissing freedom and dignity as self-indulgent, frivolous, and no longer tolerable phantasies and agents of self-deception, such scientifically grounded authorities as Professor von Bertalanffy stress the essential role, in the psychic economy and public economy and public well-being of ideal images of personal and social values. These are among telic or end-purpose models, and they provide magnetic pull and lift the individual or the group. Projected by the creative imagination, these symbolic images anticipate the future goal, and so may exercise an influential, even a decisive power, as to present or impending attitudes and actions. They are the means by which man psychically and socially "lifts himself by his bootstraps."

Further, as has already been noted, Professor von Bertalanffy sets forth the distinction between closed systems and open systems, classifies organisms—man among them—as in the second category, and stresses, as characteristic of

the latter, that they are not mere passive yielders to external stimuli. Rather, they actively respond to such stimuli through internally originating self-assertions; and, often, they initiate actions on their own. In the words of the poet, they "have a bit of fiat" within themselves. Consequently, they may defy deterministic pressures exerted upon them from the outside; and they may have careers that break through the iron rings of attempted mechanistic programmings. Professor von Bertalanffy states: "They are maintained in a state of fantastic improbability in spite of innumerable irreversible processes continually going on. Even more, organisms in individual ontogeny, as well as phylogenetic evolution, develop toward very improbable states."

In various ways, Professor von Bertalanffy thus ascribes to the open organic system, to the living system, that purposive spontaneity of functioning which is not available to the mechanical closed system—such as the nonorganic cybernetic system. He stresses spontaneous activity—hence a domain of relative autonomy and freedom—as a concomitant of the organism in its character as an open system able to maintain a state distant from equilibrium, and able to spend existing potentials in spontaneous activity or in releasing stimuli. Hence, as he sees it, man, as an open and vital system, is naturally free in the sense that spontaneous and purposive activity is, for him, primary. The Skinnerian image of man as naturally and only an alloplastic creature of stimulus-response manipulation or programming is, for Professor von Bertalanffy, a false image.⁵⁴ It is a topsy-turvy image, presenting deterministic stimulus-response behavior as primary, whereas it should be regarded as secondary—as a regulatory mechanism superimposed upon the originally self-assertive and internally generated activity of the organism as an open

⁵⁴ Cf. Professor Gerard Radnitzky's statement that the greatness of man inheres in his capacity as creator, as originator of meaning and freedom. He made this statement at an international colloquium on issues in contemporary physics and philosophy of science and their relevance to society, in tribute to Professor Werner Heisenberg on the occasion of his seventieth anniversary. (From summary of this conference, held at The Pennsylvania State University, September 1971, on *The Meaning and Function of Science in Contemporary Society*, by the colloquium developer Professor Joseph Kockelmans.)

54 Cybernation, Systems, and the Teaching of English

system. In short, Professor von Bertalanffy finds the Skinnerian model of man both genetically inaccurate and misleadingly reductivist: for him, the organism is not a robot; but rather an agent of "originally holistic behavior" which "becomes progressively, yet never completely mechanized."

For us, as English teachers, this Bertalanffian view of man—shared by such highly esteemed men of science and mind as Dr. René Dubos,⁵⁵ has far-reaching positive implications. It confirms our conviction that such values as freedom and responsibility, as personal and human dignity should be our main enduring concerns. It also is of benefit to us along the metaphysical front—along the epistemic front that deals with how we know, with how we experience, and with what it is that we know or experience, with what it is of which we say we are conscious.

This nondeterministic, voluntaristic view of man enfranchises us from what Bernard Kaplan has called the "dogma of immaculate perception." It frees us from the false notion that the organism is merely a "passive receiver of stimuli, sense data—information—coming from outside objects and processes." It enables us to see that "perception is not a passive mirroring of a world outside like a color photograph; rather incoming information is, by a creative act, organized into a universe." It confirms what Goethe stressed as central: the primacy in man of his formative nature.

A central responsibility, then, for us as English teachers, is to help our students assert their bit of fiat by encouraging them to develop strength, finesse, and imaginative courage in eliciting and fulfilling their own formative nature. To accept this challenge is, at the same time, to relegate learning systems to their appropriate role in the teaching of English—that is, a secondary role—as adjunct—not as main or exclusive agent of instruction.⁵⁶

⁵⁵ See, also, John Culhane, "En Garde, Pessimists! Enter René Dubos," who "has dueled to the death a myriad of killers invisible to the naked eye, sees clearly the threats to the environment—yet remains an optimist. Having lived all but one of the years to date of the disillusioning 20th century, he still believes that man is a noble work." (*New York Times Magazine*, 17 October 1971, pp. 44ff.)

⁵⁶ (For further references, see page 56.)

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56 Cybernation, Systems, and the Teaching of English

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From page 54.

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